Studies on Southwest Pacific Hexactinellida 2: two new hexactinosid glass sponges from the Norfolk Ridge (New Caledonia EEZ)

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ABSTRACT

Two new hexactinosid dictyonal glass sponges (Class Hexactinellida Schmidt, Order Hexactinosida Schrammen) are described from Seamount Banc Antigonia on the southern New Caledonian slope of the Norfolk Ridge. *Heterorete norfolkense* sp. nov. (Family Euretidae Zittel) shares many characters with the type species, *Heterorete pulchrum* Dendy, 1916, from north-central Indian Ocean, but the Norfolk Ridge specimens have thinner walls, smaller diameter tubes, loose surface pentactins (absent in *H. pulchrum*, uncommon in *H. norfolkense* sp. nov.) and two classes of discohexasters (vs 1 class in *H. pulchrum*). This new species is only the second known world-wide and represents a new genus record for the region. *Cyrtaulon caledoniensis* sp. nov. (Family Tretodictyidae Schulze) differs significantly in the form and dimensions of some of the spicules from the western tropical Atlantic type species, *C. sigsbeei* (Schmidt, 1880) and *C. solutus* Schulze, 1886 from the Banda Sea, Indonesia. The species also represents a first record of the genus for the South Pacific and only the third known species world-wide. ❐ *Hexactinellida, Hexactinosida, Euretidae, Tretodictyidae, Cyrtaulon, Heterorete, systematics, Norfolk Ridge, New Caledonian EEZ.*

A detailed examination of six tiny specimens in two specimen holding jars from the Queensland Museum, provisionally identified as *Farrea occa occa* Bowerbank, 1862 (Order Hexactinosida Schrammen, Family Farreidae Gray), revealed to the contrary, the New Zealand species *Farrea medusiforma* Reiswig & Kelly, 2011 and two new species, one of *Heterorete* Dendy, 1916 (Order Hexactinosida, Family Euretidae Zittel) and the other of *Cyrtaulon* Schulze, 1886 (Order Hexactinosida, Family Tretodictyidae Schulze), previously only known from Salomon Atoll in the Chagos Archipelago, Indian Ocean and the western tropical Atlantic and Indonesia's Banda Sea, respectively. The specimens were collected from IRD (Institut de Recherche pour le Développement, New Caledonia) Station CP1655 on Seamount Banc Antigonia on the south New Caledonian slope of Norfolk Ridge, providing two new genus records for the south Pacific region. Here we describe only the second known species of *Heterorete, H. norfolkense* sp. nov., comparing it to the genus type *H. pulchrum* Dendy, 1916 and the third known species of *Cyrtaulon, C. caledoniensis* sp. nov.

MATERIAL AND METHODS

Two Queensland Museum holdings, QM G318665 and QM G318547, were examined as part of a wider study of the hexactinellid sponges of the New Zealand and South Pacific region. They were collected as part of the Institut de Recherche pour le Développement, Noumea "*Norfolk 1*" and "*Norfolk 2*" voyages by RV *Alis*, led by Bertrand Richer de Forges, in 2001. Sponges collected on the voyages were sent to the Queensland Museum for identification, and the hexactinellid sponges were sent on loan to Dorte Janussen in 2004. The material was collected by seamount dredge from IRD Stn CP1655, Seamount Banc Antigonia on the south New Caledonian slope of Norfolk Ridge, part of the New Caledonian Exclusive Economic Zone (EEZ) (Fig. 1). Specimens were either frozen at -10°C or preserved in 95% ethanol, and later transferred to 70% ethanol.

The two specimens in QM G318665 were assigned to the holotype of *Heterorete norfolkense* sp. nov. One of four specimens in QM G318547 (fragment C) was also identified as *H. norfolkense* sp. nov. As both QM registrations G G318665 and G318547 are from the same IRD station, we have assumed that they are both from the same haul and thus QM G318547 (fragment C) is part of the *H. norfolkense* sp. nov. holotype specimen. The holding QM G318665 now contains three specimens. Two of the four specimens in QM G318547 were identified as *Farrea medusiforma*; these were removed from QM G318547 and re-accessioned as QM G331810. The final specimen in QM G318547, was identified as *Cyrtaulon caledoniensis* sp. nov. and retains that accession number QM G318547 and is named as holotype.

Specimens were first digitally photographed and fragments were digested in commercial sodium hypochlorite bleach. These preliminary examinations usually provided information on spicules, structure of the frameworks, presence or absence of channelisation, and type of nodes present. Wall sections about 0.5 mm^2 were excised, dehydrated, cleared, and whole mounted in Canada Balsam on microscope slides.

Preparations of cleaned spicules and dictyonal frameworks were made by taking one or two 0.5–1.0 ml subsamples from a specimen, soaking them in water to remove ethanol, then digesting them in test tubes in hot (95° C) nitric acid to dissolve organic contents from spicules and frameworks. After cooling and diluting in a small petri dish, frameworks and large spicules were picked from the suspension by forceps or pipette under a dissecting microscope, repeatedly rinsed in distilled water, and transferred either directly to clean 9 mm square cover glasses or to cover glasses coated with hot glue (tacky at 42° C), double-sided tape or epoxy. The cover glasses were attached to scanning electron microscopy (SEM) stubs by epoxy.

The clean spicules remaining in the diluted nitric acid suspension were further processed for both light microscopy (LM) and SEM. Large spicules were rinsed in water and transferred by pipette onto microscope slides and spread out with forceps and needle. After drying, Canada Balsam and cover glasses were added. A small aliquot of the remaining spicule suspension was passed through a 13 mm diameter, 0.2 µm pore-size polycarbonate membrane filter, the filter air-dried and mounted on an SEM stub using double-sided tape. The remaining spicules in suspension were deposited on three or four 25 mm diameter, 0.22 µm pore-size nitrocellulose Millipore© filters by vacuum filtration, the filters dried and mounted on slides in Canada Balsam. The dry SEM preparations were sputter-coated with gold-palladium and imaged with a Hitachi S-3500 SEM at the Biology Department, University of Victoria.

Measurements of spicules were made using a digitiser optically coupled to either compound or dissecting LM by drawing tube (camera lucida) and Sigma-Scan® software. Framework elements were either measured directly by LM as above, or indirectly by using the image-analysis software SigmaScan Pro® on the SEM images. Dimensions are given in a table associated with the 'Description' section for each species. Dimensions are cited as mean (mean) and standard deviation (s. d.), range, and the number of measurements made (no.).

Primary type material of the new species are deposited in the Queensland Museum and accessioned into their biodiversity collections (prefix QM G—). Abbreviations used in the text: EEZ, Exclusive Economic Zone; IRD, Institut de Recherche pour le Développement, Noumea, New Caledonia; LM, light microscopy; NHMUK, prefix to registration numbers for the Natural History Museum, London; No., number of measurements made; QM G, accession prefix for Queensland Museum biodiversity collections, Brisbane; SEM, scanning electron microscopy; s.d., standard deviation.

SYSTEMATICS

Class HEXACTINELLIDA Schmidt, 1870

Order HEXACTINOSIDA Schrammen, 1903

Family EURETIDAE Zittel, 1877

Heterorete Dendy, 1916

Heterorete Dendy, 1916: 214.

Type Species. *Heterorete pulchrum* Dendy, 1916 (by original designation).

Diagnosis. Euretidae with body form of branching, thick-walled tubes terminally open as oscula (anastomoses sometimes uncertain); with epirhyses and aporhyses (questionable) penetrating nearly the entire wall; dictyonal framework profusely and coarsely spined and consisting of two distinct regions – a main euretoid network of normally thick beams forming irregular triangular and rectangular meshes and an atrial network of thin, loosely-fused hexactins with junctions occurring at ray-crossing points and most rays remaining free (closed meshes mostly lacking); nodes not swollen; loose ectosomal spiculation consists of discohexasters with or without rare pentactins; choanosomal spiculation of spined oxyhexactins and regular and irregular discohexasters. Proper sceptrules and uncinates are absent (emended from Reiswig & Wheeler 2002).

Heterorete norfolkense sp. nov.
(Figs 1–3; Table 1)

Material Examined. HOLOTYPE: QM G318665, IRD Stn CP1655, Seamount Banc Antigonia, south New Caledonian slope of Norfolk Ridge (New Caledonian EEZ), 23.524° S, 168.076° E, 680 m, 19 June 2001, RV *Alis*. NORFOLK 1 voyage, coll. Bertrand Richer de Forges, 3 fragments (Fig. 1). Comparative Material. *Heterorete pulchrum*, holotype, NHMUK 1920.12.9.64: H.M.S. *Sealark*, Stn C, Salomon Atoll, Chagos Archipelago, Indian Ocean, 4.170° S, 92.020° E, 220–274 m, 03 July 1905.

Description. *Shape*. The holotype consists of three fragments (Figs 2A–B), each a spherical network of loosely branching and anastomosing broad and wide-mouthed tubes, one of which is attached to the calcareous skeleton of a bryozoan.

Dimensions. Holotype fragments are 1) 37.8 long x 32.0 wide x 17.2 mm thick; 2) 35.4 long x 28.6 wide x 15.7 mm thick; 3) 31.6 long x 24.0 wide x 19.8 mm thick. Tubes are slightly oval, 5.5 x 6.0 mm diameter, (range 3.7–8.3, n=57) with wall thickness of 0.9 ± 0.2 (0.4–1.4) mm, n=63. Intercanals have the same dimensions as the tubes.

Texture. Hard and moderately resistant to breakage. Surface of both inner and outer wall sides are smooth to the naked eye but when inspected at low magnification of a dissecting microscope, both are covered with small openings of shallow canals, epirhyses on the dermal side and aporhyses on the atrial side (Fig. 2C, D). With higher magnification, large discohexasters are seen standing out on dictyonal prominences of the dermal surface (Fig. 2E).

Colour. Light beige when preserved, wet or dry.

Ectosomal skeleton. Consists of free spicules: surficial pentactins, uncinates (probably foreign), and two sizes of discohexasters.

Choanosomal skeleton. A fused dictyonal network of rather irregular construction. Throughout the thickness of the wall (Fig. 2F) and on the dermal surface (Fig. 2G–I) the beams are rather uniform in thickness and nodes are simple. Meshes are triangular and rectangular but there is no suggestion of longitudinal strands. Frame nodes inspected in 80% sucrose showed most have a single axial cross (48 of 59)

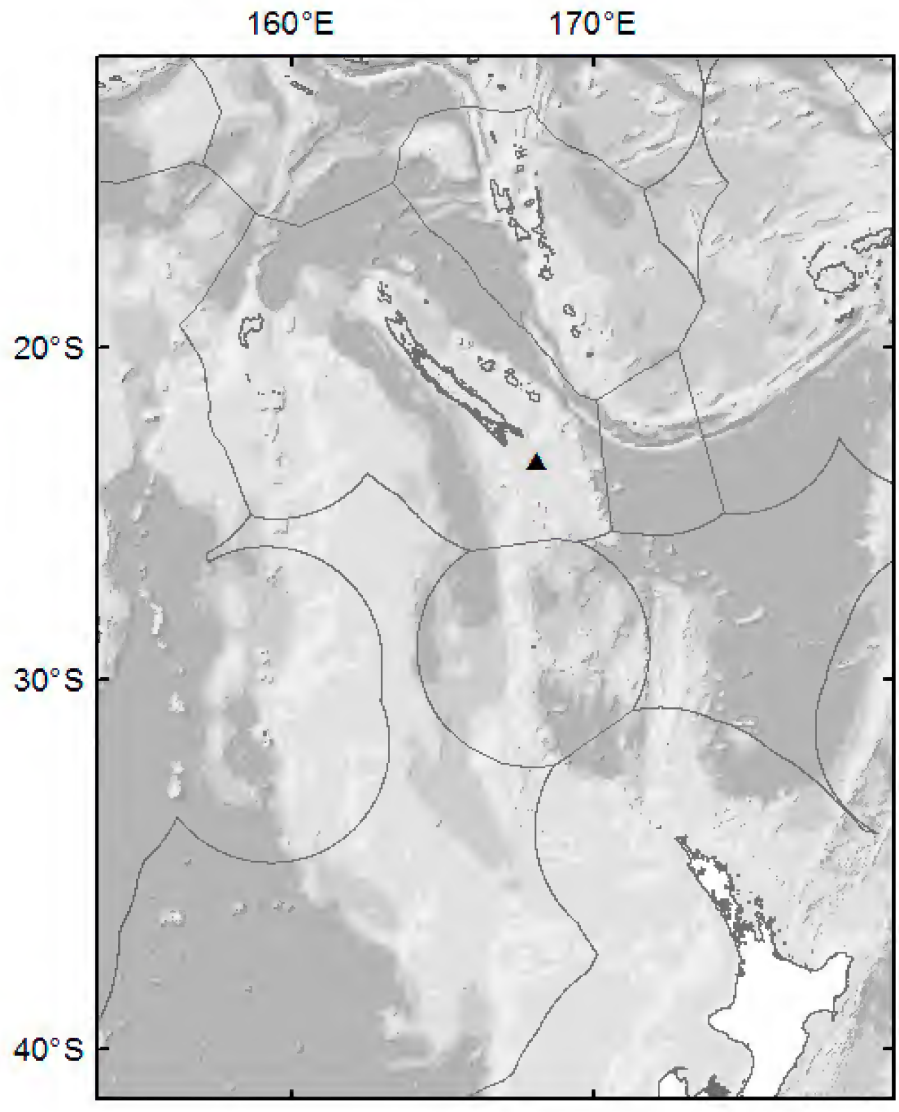

FIG. 1. Study area showing the collection locality of the holotype of *Heterorete norfolkense* sp. nov. and *Cyrtaulon caledoniensis* sp. nov., Seamount Banc Antigonia on the southern New Caledonian slope of Norfolk Ridge.

but several (11 of 59) contained two axial crosses. Synapticula with and without axial canals are common. The atrial surface has a patchy development (Fig. 2J–L) of bushes of small thin hexactins forming candelabras (groups of free rays without attachments). These appear to be stable elements that do not undergo thickening since they occur over all of the atrial surface of the specimen. Small patches of smaller spiny oxyhexactins are found scattered through the framework, fused to each other and onto beams. Some of these have all six rays intact and appear to be components of the free spicule complement. In addition, there are free uncinates (probably of foreign origin) and discohexasters in the endosome.

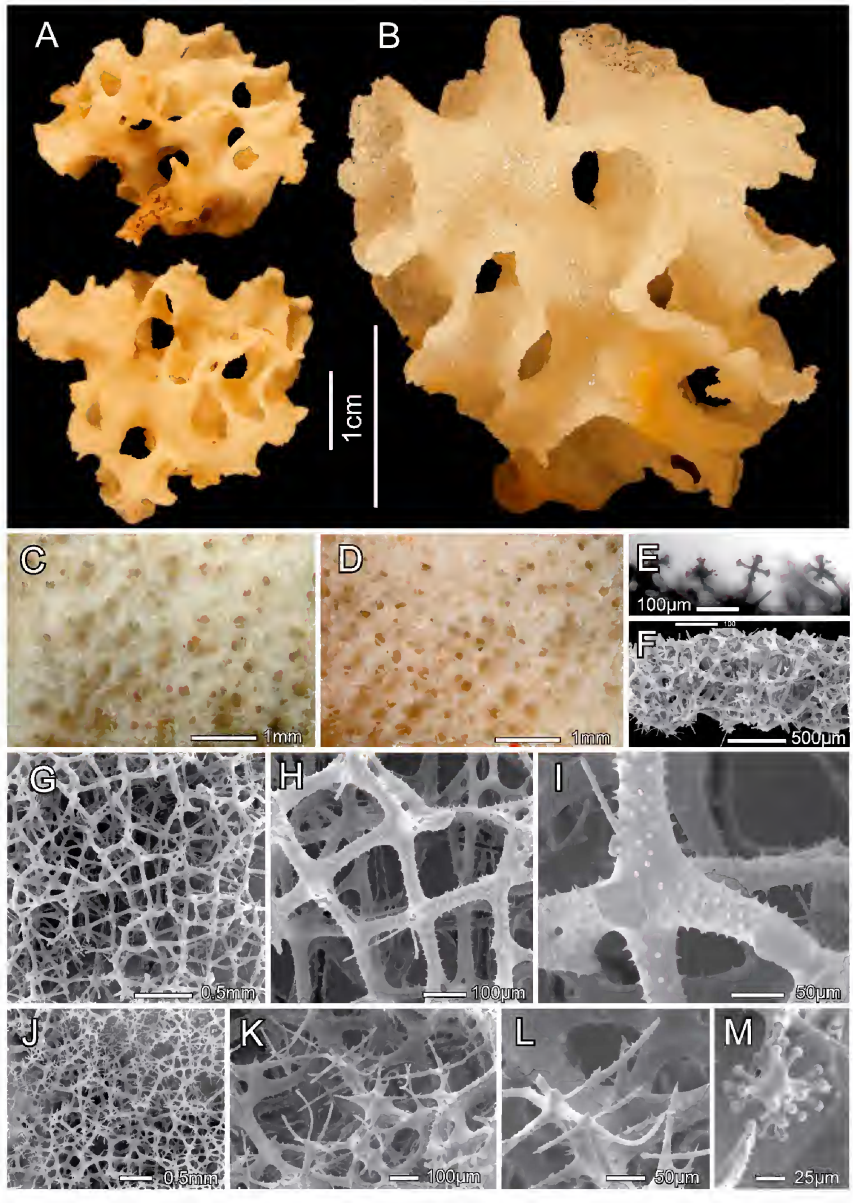

FIG. 2. *Heterorete norfolkense* sp. nov., holotype QM G318665. **A–B**, holotype as three fragments presumed to be from the same specimen; **C**, close-up of dermal surface of holotype showing epirhyses; **D**, close-up of atrial surface of holotype showing aporhyses; **E**, tangential surface view of dermal surface of holotype with discohexasters on framework prominences; **F**, wall section of the cleaned skeletal framework of holotype; **G**, cleaned framework of the dermal surface of holotype with indistinct epirhyses; **H**, closer view of dermal framework of holotype showing spurs and relatively simple beams; **I**, closer view of dermal dictyonalium of holotype with small, sharp conical spines on beams and nodes; **J**, atrial framework of holotype at low magnification showing patchy distribution of small dictyonalia; **K**, closer view of the fine atrial dictyonalia with curved rays; **L**, closer view of the atrial dictyonalia and its contrast with the normal framework beams in the background; **M**, discohexaster fused onto the framework.

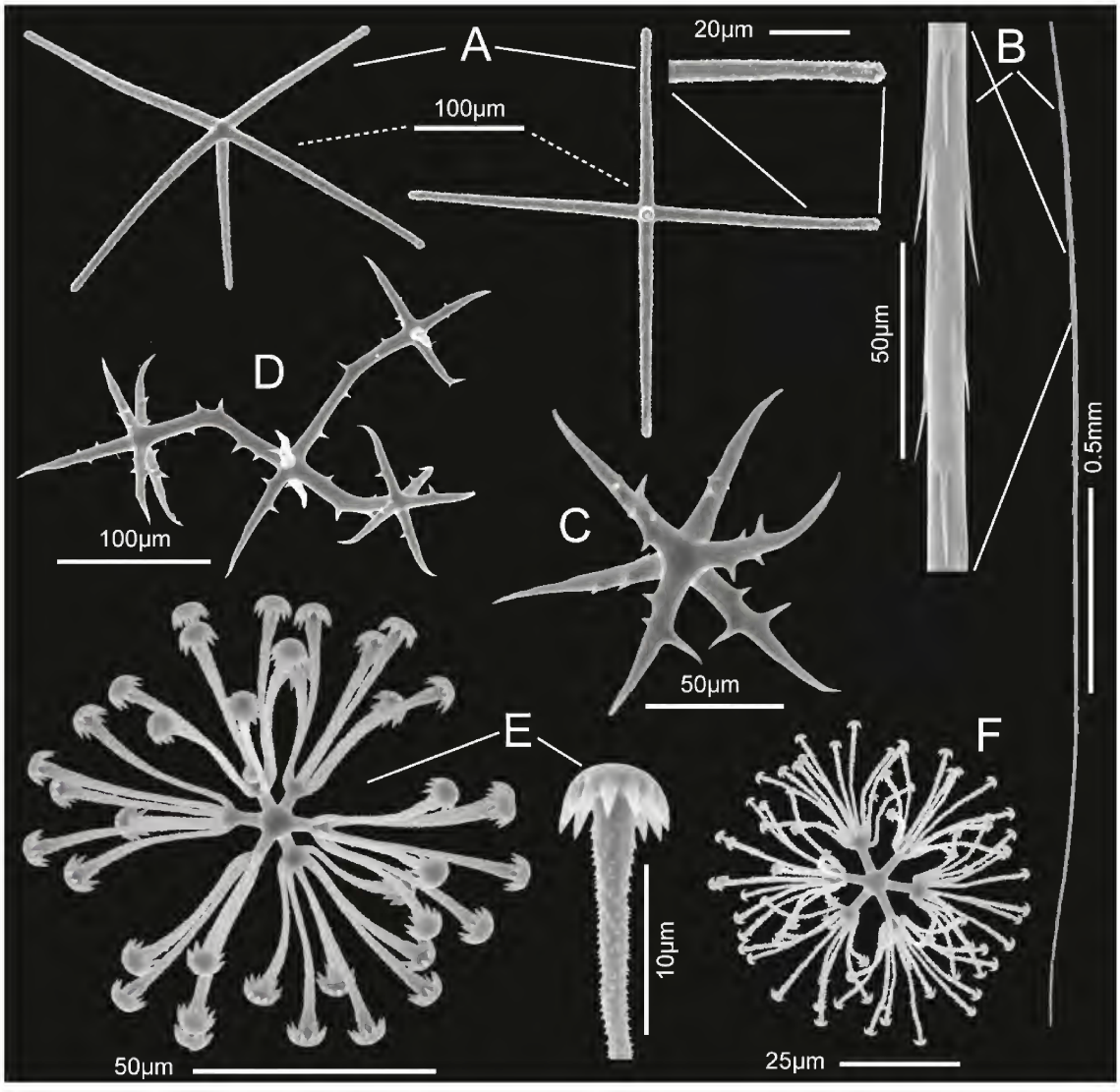

FIG. 3. *Heterorete norfolkense* sp. nov. holotype QM G318665, spicules. **A**, two surficial pentactins, whole and enlarged tangential ray end; **B**, uncinate (almost certainly foreign), whole and enlarged anterior segment; **C**, spiny microxyhexactin; **D**, spiny microxyhexactins fused together and fused to the skeletal framework; **E**, large discohexaster with enlarged secondary ray end; **F**, small discohexaster.

Megascleres. (Fig. 3; Table 1): Restricted to uncommon surficial pentactins and uncinates (probably foreign). Pentactins (Fig. 3A) are entirely finely rough with cylindrical rays ending in rounded tips. The proximal rays are usually shorter than the tangential rays, but intact spicules are hard to find. Uncinates (Fig. 3B) are moderate in size and have no special characters; brackets and barbs are well developed and barb inclination is slight.

Microscleres. (Fig. 3; Table 1): Microxyhexactins and two sizes of floricate discohexasters. Microxyhexactins (Fig. 3C) are small but thick-rayed, bearing a few large spines on each of the

otherwise smooth rays. Groups of very similar spicules are encountered fused to each other and to the framework dictyonalia, suggesting that their joining is a secondary process taking place after the spicule is completely formed (Fig. 3D). Large discohexasters (Fig. 3E) have weakly sigmoid rays in floricate tufts; they could be characterised as spherical or pseudostellate. Primary rays are smooth but secondary rays are densely covered with sharp small reclined spines; terminal discs are hemispherical and bear 10–15 sharp marginal spines. Small discohexasters (Fig. 3F) are very similar to the large ones but the terminal rays are relatively thinner and more strongly sigmoid and their primary rays are proportionately longer. Their terminal discs contain 6–10 marginal spines.

Type location. Seamount Banc Antigonia, south New Caledonian slope of Norfolk Ridge (Fig. 1).

Distribution. Known only from the type locality.

Substrate, depth range, ecology. Attached to hard substratum by siliceous attachment disk, depth 680 m.

Etymology. The species name *norfolkense* reflects the general type locality, the Norfolk Ridge south of New Caledonia.

Remarks. The three fragments from the Norfolk Ridge have skeletons compatible only with the genus *Heterorete*, with the type species *H. pulchrum*, from north-central Indian Ocean as the only member. The new fragments share many characters with *H. pulchrum*, including sizes of framework beams and meshes, distinctive atrial framework, surface pits, simple nodes, framework spines, stout oxyhexactins, floricoid discohexaster and their occasional fusion onto the atrial framework (Fig. 2M). The key differences are, however, that the New Caledonian specimens have thinner walls (0.9 vs 2.0 mm), smaller diameter tubes (6 mm vs 8 mm), loose surface pentactins (absent in *H. pulchrum*), uncinates (absent in *H. pulchrum* but also probably not proper here) and two classes of discohexasters (vs 1 class in *H. pulchrum*). The pentactins and uncinates could be explained by their transfer from other specimens, *Farrea medusiforma* and *Cyrtaulon caledoniensis* sp. nov., collected in the same

TABLE 1. Spicule dimensions (μm) of *Heterorete norfolkense* sp. nov., holotype QM G318665.

Parameter	mean	s.d.	range	no.
Surficial pentactin				
tangential ray length	195	25	136–271	69
ray width	10.2	2.9	4.6–19.0	72
proximal ray length	127	31	64–177	19
ray width	10.5	2.7	6.0–17.0	20
Uncinate length	1678	518	333–2387	20
width	7.5	1.7	3.1–11.1	24
Spined oxyhexactin diameter	106	35	33–173	31
Large discohexaster diameter	96.5	11,2	70.9–126.0	143
primary ray length	8.1	1.1	5.5–10.8	143
secondary ray length	40.1	5.1	26.6–53.7	143
ratio 1°/2° ray length	0.204	0.033	0.131–0.371	143
Small discohexaster diameter	62.7	10.4	36.4–86.2	89
primary ray length	8.5	1.2	6.0–11.6	89
secondary ray length	23.0	5.0	11.6–32.4	89
ratio 1°/2° ray length	0.389	0.100	0.201–0.692	89

trawl. However, comparison of the form and sizes of the pentactins of those specimens with those of *H. norfolkense* sp. nov. shows that they are not the source, but the uncinates could be from either species; thus the pentactins appear to be proper although uncommon. Neither pentactins nor uncinates were found in whole mounts of fragments although microscleres were common. Absence of the pentactins in these preparations is understandable since they are rare and easily lost during manipulation of the specimen. Absence of uncinates, the spicule most resistant to loss, is strong evidence that those found in spicule preparations are foreign in origin.

The two size classes of discohexasters in *H. norfolkense* sp. nov. are not supported by frequency distribution of their diameters, but this does not negate that two classes exist here. Their difference is in the degree of robustness, the degree of curvature of secondary rays and the numbers of marginal spines of terminal discs. A quantitative approach to assess shape is the ratio of lengths of primary to secondary rays; in *H. norfolkense* sp. nov. the means of this ratio are 0.205 and 0.382 for the two classes of discohexasters. In *H. pulchrum*, however, there is no obvious difference in form among the highly variable sizes of discohexasters, but if two types were present we would expect there would be differences in the ratios of the largest and smallest discohexasters. We took the smallest and largest 10 of 50 discohexasters and determined their ray ratios: 0.227 and 0.306 respectively. There appears to be a shape difference between the small and large discohexasters in *H. pulchrum* but it is not as great as in *H. norfolkense* sp. nov. and does not approach the very long primary rays seen in the smaller discohexasters of the Norfolk Ridge sponge. The two known species are broadly separated: *pulchrum* is from Salomon Atoll in the Indian Ocean while *norfolkense* sp. nov. is from the Norfolk Ridge in the South Pacific. Locality, morphology (wall thickness) and spicule differences (surface pentactins) are sufficient to conclude that *H. norfolkense* sp. nov. is a unique species and only the second known for the genus.

Family TRETODICTYIDAE Schulze, 1886

Cyrtaulon Schulze, 1885

[*Volvulina*] Schmidt, 1880: 58 (preoccupied).
Cyrtaulon Schulze, 1886: 81; Schulze, 1887: 332, Pl. 92.

Type species. *Volvulina sigsbeei* Schmidt, 1880.

Diagnosis. Body cup-form or cylindrical without atrial cavity; superficial dictyonal nodes and beams may be hypersilicified (swollen) or not; dermalia as pentactins, with or without hexactins; regular scopules may or may not be present; medium-sized uncinates present, with or without a central swelling; in addition to the 'cyrtaulon-spicule', there are only discohexasters or no other microscleres present (Reiswig, 2002).

Cyrtaulon caledoniensis sp. nov.
(Figs 1, 4–5; Table 2)

Material examined. HOLOTYPE: QM G318547, IRD Stn CP1655, Seamount Banc Antigonia, south New Caledonian slope of Norfolk Ridge (New Caledonian EEZ), 23.524° S, 168.076° E, 680 m, RV *Alis*. NORFOLK 1 voyage, coll. Bertrand Richer de Forges, 19 June 2001.

Description. *Shape*. Morphology of the holotype a moderate-size blockish convoluted fragment perforated with small passages (Fig. 4A–B) from a dictyonal sponge with unknown total body form, perhaps conical or foliose, but is not constructed of component tubes. Two zoanthids occupy passages through the wall.

Dimensions. Holotype 13.9 long x 13.3 wide x 10.1 mm thick. The wall is 0.83 ±0.16 (0.64–1.15) mm, n=14 thick and completely penetrated by ovoid holes much larger in diameter than wall thickness, 2.1 x 1.7 mm (range 1.0–4.7, n=28) but extending down to minute passages (Fig. 4C).

Texture. Hard and rigid. Surface appears by eye and dissecting microscope as if composed of thick lumpy beams between large spaces (Fig. 4C).

Colour. Light beige to white depending upon immersion fluid and light source intensity (Fig. 4A–B).

Ectosomal skeleton. Composed of loose spicules; pentactins, cyrtaulon-spicules and uncinates (in part). Two forms of microscleres are also present here since they are generally distributed.

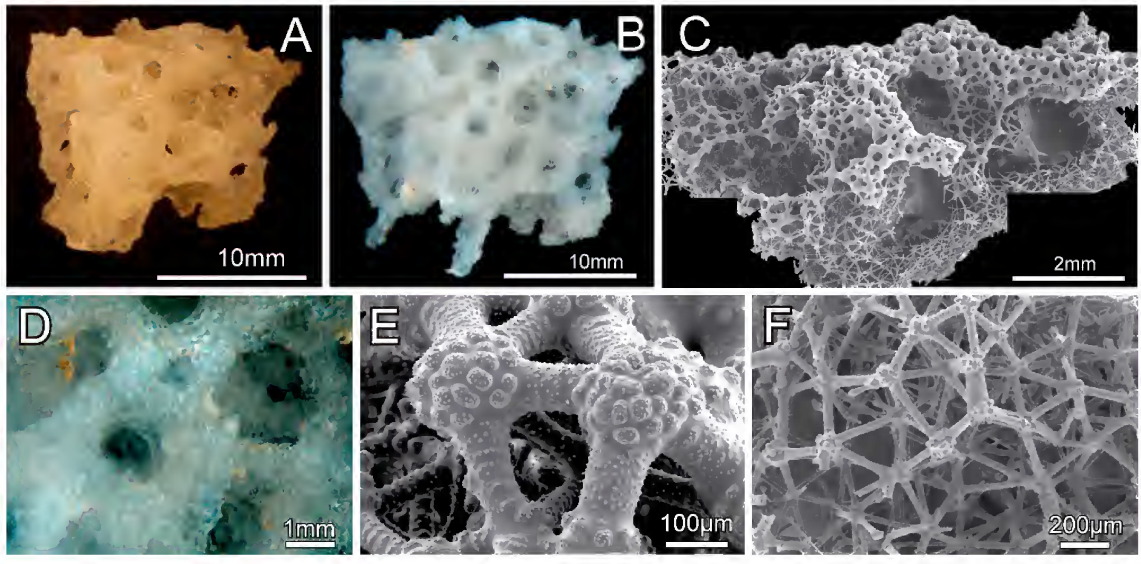

FIG. 4. *Cyrtaulon caledoniensis* sp. nov. holotype QM G318547. **A**, holotype after subsampling; **B**, holotype before subsample under different illumination; **C**, close up showing rough texture of beams between wall holes; **D**, wall fragment with perforations and thickened external frame surface; **E**, close view of swollen, warty external (dermal) nodes and thickened beams; **F**, surface nodes of the internal (atrial) and internal wall nodes and thin beams.

Choanosomal skeleton. Consists of a fused dictyonal framework on which the beams and nodes are thickened on one side (Fig. 4D), presumably the dermal or external surface; the nodes of this side are covered in large warts and finely spined while the beams bear small spines often arranged in transverse bands (Fig. 4E). Spurs are rare on this surface due to a combination of their being subsumed by silica deposition during beam thickening and by this surface being more exposed to erosion. Beams and nodes of the other side, presumably atrial and internal, are smaller (Fig. 4F) and similar to the deeper internal parts of the framework where thickening has not occurred. Meshes are mainly triangular, rarely rectangular or polygonal; most nodes are polyradial and their arrangement is rotular, without evidence of longitudinal strands or nodal ranking. Dimensions of the beams and nodes of the two surfaces are given in Table 2. Loose spicules associated with the endoskeletal framework are large uncinates and the generally distributed microscleres.

Megascleres. (Fig. 5; Table 2): Restricted to three types - surficial pentactins, cyrtaulon-spicules and uncinates. The surficial pentactins (Fig. 5A) are moderate in size, entirely finely rough with cylindrical rays (not tapering) ending in slightly inflated rounded tips. A distinct lattice formed by these spicules has not been found, instead they occur in low numbers between surface nodes where they were moved during collection. In minimally disturbed specimens a distinct lattice of pentactins may occur on both sides. Cyrtaulon-spicules are here considered analogs of scopules and thus categorised as megascleres. The cyrtaulon-spicules (Fig. 5B) have a small swollen head at the top of the long filiform rachis (stem). The head supports 9.3 (4–15), n=50 rather straight rays ornamented laterally by recurved spines and capped by anchorate discs with 7 (3–10+), n=31 long marginal teeth; abnormal discs with subdivided teeth or tufts of short spines occur uncommonly. Branching of the short upper rays is rare and occurs only near their attachment to the head. The rachis is ornamented only by a few scattered recurved spines and is subterminally inflated above a short terminal process. Proper scopules are absent. The uncinates are of moderate size with

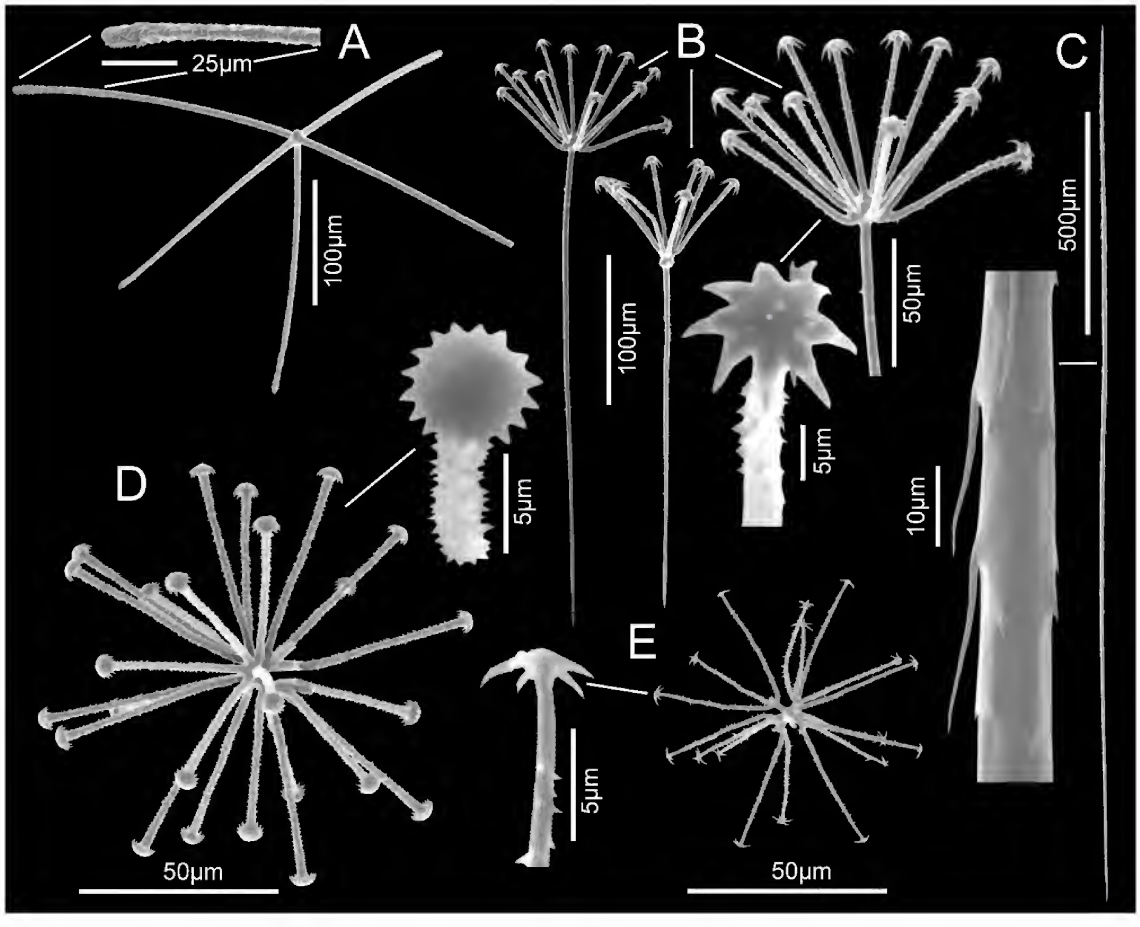

FIG. 5. *Cyrtaulon caledoniensis* sp. nov., holotype QM G318547, spicules. **A**, surficial pentactin, whole and enlarged tangential ray end; **B**, cyrtaulon-spicules, whole, enlarged distal end and further enlarged anchorate disc tip; **C**, uncinate, whole and enlarged upper segment; **D**, discohexaster with enlarged pileate disc tip; **E**, onychohexaster with enlarged anchorate tip.

well-developed brackets and barbs (Fig. 5C); barbs are inclined about 10° from the uncinate surface. Dense populations of microuncinates are absent.

Microscleres. (Fig. 5; Table 2): Discohexasters and onychohexasters. Discohexasters (Fig. 5D) are spherical with very short or even unmeasurable primary rays and long straight cylindrical secondary rays densely ornamented laterally with small reclined spines and ending in a hemispheric pileate disc with about 17 small marginal teeth. Onychohexasters (Fig. 5E) are similar in dimensions but compared to the discohexasters, they are generally slighter, have sparser lateral spine ornamentation and have anchorate tips without a significant central swelling; terminal claws range from 3–6.

Type location. Seamount Banc Antigonia, southern New Caledonian slope of Norfolk Ridge (Fig. 1).

Distribution. Known only from the type locality.

Substrate, depth range, ecology. Presumed to have been attached to hard substratum by siliceous basal disc but not present in the fragment collected, depth 680 m.

Etymology. The species name *caledoniensis* reflects the type locality region, the New Caledonia EEZ.

TABLE 2. Framework and spicule dimensions (µm) of *Cyrtaulon caledoniensis* sp. nov., holotype QM G318547.

Parameter	mean	s.d.	range	no.
External swollen framework				
node diameter	189	24	140–269	50
beam length	288	52	164–426	50
beam width	92	2-	56–147	50
spur length	172	41	120–275	28
Internal less-swollen framework				
node diameter	83	14	49–117	50
beam length	260	50	173–378	50
beam width	30.7	5.4	20.7–43.1	50
spur length	135	40	54–245	50
Pentactine surfalia				
tangential ray length	205	35	130–280	50
ray width	5.6	1.2	3.5–8.4	50
proximal ray length	185	55	95–391	50
ray width	5.5	0.9	4.0–8.0	50
Cyrtaulon-spicule total length	341	41	215–423	50
primary ray length	70.8	8.1	53.3–88.7	50
shaft width at top	4.3	0.8	2.2–6.2	50
Uncinate length	1542	556	360–2567	50
width	7.4	2.3	2.4–11.8	50
Discohexaster diameter	105	11	85–131	50
primary ray length	4.3	0.8	3.0-6.4	50
secondary ray length	48.5	5.7	38.2–60.7	50
Onychohexaster diameter	101	13	62–123	50
primary ray length	4.4	0.6	3.0–5.4	50
secondary ray length	46.7	8.7	21.7–64.8	50

Remarks. Assignment of QM G318547 to the genus *Cyrtaulon* is certain based upon the presence of special cyrtaulon-spicules and no other character precluding membership in Tretodictyidae. The genus *Cyrtaulon* presently contains two species, *C. sigsbeei* (Schmidt 1880) in the tropical western Atlantic and *C. solutus* Schulze, 1886 from the Banda Sea, Indonesia. The new form shares the perforated body wall, the swollen and warty superficial external framework nodes, and surface pentactins with *C. sigsbeei* but differs from this in larger cyrtaulon-spicule (215–423 vs 184–271 µm length), rare branching of the distal rays of cyrtaulon-spicules, larger uncinate [1542 (350–2567) vs 941 (737–1142) µm length], larger discohexaster [105 (85–131) vs 43 (33–60) µm diameter], and presence of onychohexasters (absent in *C. sigsbeei*). *Cyrtaulon caledoniensis* sp. nov. differs from *C. solutus* in its lack of proper scopules and lack of microuncinates and presence of both discohexasters and onychohexasters (both lacking in *C. solutus*). On the basis of these significant differences from both of the accepted species, the New Caledonian specimen is considered a member of a new species, here designated *Cyrtaulon caledoniensis* sp. nov.

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